

Smart Bodies

Abstract

Smart Bodies is a comprehensive, nutrition education and physical activity program designed to help promote child wellness. Smart Bodies integrates classroom activities with hands-on learning to teach elementary school children how to build strong bodies and develop active minds. Smart Bodies consists of three components: 1) the Body Walk, an interactive exhibit representing the human body, 2) the OrganWise Guys, characters that educate and encourage children to practice healthy habits, and the 3) Take 10! curricula, a classroom-based nutrition education and PA program. Launched in March 2005, Smart Bodies is the result of a public-private partnership between the Louisiana State University Agricultural Center and Blue Cross and Blue Shield of LA Foundation, the charitable subsidiary of the state's largest health insurer.

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Sources of Funding

The primary and most substantial funding for the program is from Blue Cross and Blue Shield of Louisiana Foundation. Other funding entities include: the Louisiana Supplemental Nutrition Assistance Nutrition Education Program (SNAP-ED), Pennington Family Foundation, General Mills, Baton Rouge Epicurean Society.

Knowledge and Research Base

As First Lady Michelle Obama and others have warned, childhood obesity is an epidemic. While the prevalence of obesity has more than doubled for preschool children aged 2-5 years and adolescents aged 12-19 years and more than tripled

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for children aged 6-11 years during the past three decades, the statistics for the state of Louisiana (LA) are particularly alarming. Findings from a recent legislative report indicated that 50% of LA youth were classified as either overweight or obese. More specifically, for children ages 5 through 12, 19% were overweight and 31% were classified as obese (Katzmarzyk, 2010). Our own findings indicated that 18% of 4th and 5th graders were overweight and 22% were obese (Lakkakula et al. 2010; Lakkakula et al. 2008; Lakkakula et al. 2006).

Children who are overweight/obese are often overweight/obese as adults. Being overweight or obese substantially increases a person's risk for the development of nutrition-related chronic diseases such as cardiovascular disease, type 2 diabetes, some forms of cancer, stroke, sleep apnea, hypertension, and osteoarthritis (Centers for Disease Control[CDC], n.d.). Further, pediatricians are reporting an increase in the number of overweight children who are being diagnosed with "adult diseases" such as type 2 diabetes (Ludwig & Ebbeling, 2001). Medical costs related to the treatment of obesity accounted for 10% of total medical spending and totaled \$147 billion annually (Trust for America's Health, 2012).

Further complicating the situation is the fact that states with the highest adult and childhood obesity rates tend to be located in the South and have the highest poverty rates in the country. Louisiana has one of the highest poverty rates in the nation and an estimated 27% of children in the state live in poor families (Kids Count, 2012). In LA, 703,390 students were enrolled in elementary or secondary education for the 2011-2012 school year. Sixty-seven percent (472,268) of LA public elementary and secondary students qualified for free or reduced lunch (Louisiana Department of Education, 2012). Children who qualify for free or reduced price meals through the National School Lunch Program (NSLP) at a public school are more likely to be overweight (Li & Hooker, 2010).

Because it is estimated that over 55.1 million children attend public and private schools in the United States, schools have been identified as a key component to the prevention of childhood obesity (National Center for Educational Statistics, 2012). To further support this concept, in 2004 the Federal Government enacted the Child Nutrition and WIC Reauthorization Act, which requires all school systems participating in the NSLP to establish and implement school wellness policies. Wellness policies for each school district must be developed to address the following: nutrition and physical activity (PA) goals, nutritional guidelines for foods, and plan for evaluation (AFHK, 2006).

Needs Assessment

Obesity is a growing healthcare problem in LA, and carries with it significant costs, both in terms of dollars and lives (Trasande, Liu, Fryer & Weitzman, 2008). In order to reduce the prevalence of overweight/obesity, it is essential that we teach younger children to adopt healthy behaviors now, before unhealthy habits are established.

The prevalence of overweight/obesity in children can be confronted through comprehensive health programs designed to educate and change behaviors in a variety of settings, beginning with the classroom and in the home. To accomplish this, several public health agencies, such as the Institute of Medicine, have encouraged the establishment of public-private partnerships (IOM, 2006). Accordingly, in the planning stages, the Louisiana State University Agricultural Center (LSU AgCenter), sought and established a public-private partnership with the charitable subsidiary of LA's largest health insurer, Blue Cross and Blue Shield of Louisiana Foundation (BCBSLA). After the partnership was established, various school-based nutrition education and PA curricula and programs were reviewed and evaluated (curricular components of SB are described later in this paper). Based on the successes of the Delta HOPE (Healthy Options for People through Extension) Tri-State Initiative, SB was formed as a signature three-part comprehensive nutrition education and PA program for elementary school children. An additional component, the Body Walk, was added to create a more interactive, learned-centered educational experience.

Curricular materials utilized in SB address both nutrition education and physical activity; therefore, schools in LA can use the curricula in the program to fulfill mandates set forth by the 2004 Child Nutrition and WIC Authorization and 2009 Healthy, Hunger-Free Kids Acts. Because the mandate did not establish provisions for funding to support implementation or evaluation of wellness policies, the SB Program provides schools and teachers with needed resources at no cost to improve eating habits and increase nutrition knowledge and PA levels of elementary students.

Over the years, the commitment of schools to provide students with appropriate, regular PA has decreased dramatically. As a result, the LA legislature passed a law which requires public schools to provide students in kindergarten through 8th grade with a minimum of 30 minutes per day of PA. One component of SB, Take 10! helps schools meet this legislative mandate (Act No. 286). Studies have also demonstrated that even one hour of additional PA per week among children will impact the incidence of overweight or obesity (National Institute for Healthcare Management Foundation, 2003). By performing one Take 10! daily, students will receive a minimum of 50 minutes of additional, quality, PA each week.

Program Goals and Objectives

The overall goal of the Smart Bodies Program is to promote lifelong healthy eating patterns and physically active lifestyles to LA's children and their families.

The objectives of the program are to have children:

- Increase basic nutrition knowledge
- Understand importance of physical activity
- Increase time spent in physical activity
- Increase intake of fruits and vegetables
- Increase knowledge about the digestive system of the human body

Target Audience

The target audience for the SB Program includes public or private elementary schools in LA and their students in grades K-5 with emphasis on limited income youth. Participating schools' administrators, faculty, and parents/guardians are served indirectly through the program by receiving monthly newsletters, activity books, and the OrganWise Guys (OWG) and Take 10! curricula. Parents/guardians also have the opportunity to volunteer and participate in the Body Walk when it visits their child's school. Schools can only participate in the program if they agree to implement curricula contained within SB for a minimum of 12 weeks (which can be staggered throughout the entire school year).

Type of Program

Smart Bodies is a 4-H youth enrichment program. Smart Bodies is an innovative program of nutrition and physical activities that is integrated into core curriculum academics to promote child wellness. Smart Bodies targets children in grades K-5 and integrates classroom activities with hands-on learning to teach children how to build strong bodies and active minds. Smart Bodies consists of three components: Body Walk, the OrganWise Guys, and Take 10! classroom-based PA curricula.

Delivery Methods

- Louisiana Cooperative Extension, Family and Consumer Sciences (FCS), and 4-H field agents (referred to as AgCenter agents) conduct teacher trainings with participating schools shortly before the school year begins.
- In the fall, the program "kicks off" when the local AgCenter agent organizes and executes a 30-minute interactive school assembly for grades K-2 and 3-5 to introduce the OWG and build excitement and enthusiasm for the Body Walk, OWG and Take 10! (See Photos 1 & 2 in Appendix).
- After the assembly, the teachers then implement the Take 10! and OWG activities within their classrooms to promote wellness and healthy eating habits. More specifically, teachers and their students watch one OWG video per month, read one OWG book per week, perform one Take 10! activity per day, and track activities on supplied posters and calendars.
- During the implementation period, the Body Walk will arrive at the school. During the Body Walk, the students tour the body as a food and participate in hands-on activities in each "organ", which enables them to understand the effect that different foods and health behaviors have on each organ. The educational activities within each station are facilitated by volunteers. At the end of their tour, each student receives an activity book to complete with their families.
 - The inside cover of all activity books contain a full-page advertisement for 4-H to facilitate student enrollment.
- After Body Walk, teachers continue to implement the program in classrooms.
- Monthly-themed newsletters with PA tips (family fun) and kid-friendly recipes emphasizing fruits and vegetables are sent home to parents/guardians or posted on school websites, SB website and Facebook page.

- Schools receive a “We’re a SB School” yard sign and posters branded with logos and the website address to display in the front of the school and to create awareness among parents and community members.
- AgCenter agents visit schools to monitor adherence to the program.
- Teachers and students receive educational incentive items (with health messages) to encourage continuous participation. Incentive items include magnets, stickers, water bottles, pedometer, pencils, rulers, and notepads.
- AgCenter agents provide technical assistance to participating schools throughout the school year.

Curricula and Educational Materials

- **The Body Walk** is a 35-foot by 45-foot walk-through exhibit representing the human body. Students explore the brain, mouth, stomach, small intestines, heart, lungs, muscles, bones, and skin stopping at learning stations to participate in interactive activities focused on the effects that the food has on each organ. Students also receive an activity book to share with their families (See Photos 3, 4, 5 in Appendix).
- **The Organ Wise Guys** are fun characters that help children understand physiology and healthy behaviors through books, games, dolls and informational videos. Each participating school receives a **free healthy school kit** with eight videos, Organ Annie and Andy dolls, books, games, puzzles, fruit and vegetable tracking posters and Take 10! activities. The OWG curriculum won the 2005 Innovation in Prevention Award (See Photos 6, 7, 8 in Appendix).
- **The Take 10! Classroom Program** is a grade-specific educational tool that encourages short bouts of PA integrated with academic lessons. Activities provided in all curricular materials are linked to the grade-level expectations (GLEs) and Common Core State Standards established by the LA Department of Education. In combination with the OWG, Take 10! received a gold rating (the highest) by the Cooper Institute in 2005. (See Photo 9 & 10 in Appendix)
- Parent newsletters are monthly themed and include tips for incorporating PA into family life and kid-friendly, low-cost recipes emphasizing fruits and vegetables.
- Marketing and educational incentive materials were designed by the LSU AgCenter Communications faculty. Items include magnets, water bottles, pedometer, stickers, and exhibits. Each item contains nutrition messages such as “low-fat, high fiber, lots of water, exercise!” or promotes the SB website (www.smartbodies.org) and Facebook page. These are distributed to youth, faculty, administrators, volunteers, and parents (See Photo 11 in Appendix).

Teamwork and Collaboration

At the state administration level, the SB team consists of a grant principal investigator, a Body Walk manager, research associate and two faculty members from the LSU of Human Ecology and Department of Kinesiology. AgCenter agents in all LA parishes have implemented the program at the parish-level.

Other Collaborators:

- 4-H Volunteer and Jr. Leaders—serve as volunteers for in the Body Walk

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- Blue Cross and Blue Shield of LA participates in an ongoing marketing campaign with the intention of promoting child wellness and healthy behaviors and helps to establish BCBS and the LSU AgCenter as leaders in child wellness and health promotion.
- School board officials, administrators and faculty in all 64 parishes (counties) in the state have been supportive of the program and have implemented or will implement the program by Fall 2012.
- American Dental Association has provided dental kits for students.
- Area banks, hotels, grocery stores, and restaurants have provided healthy snacks for students and parents who volunteer for the Body Walk.

Several organizations have provided volunteers to assist schools with the Body Walk and endorsed/promoted the program via websites, invitations to present at conferences and/or meetings, and presentation of awards.

The following list provides a sample of organizations, including: Baton Rouge General Hospital, LSU, Jefferson Parish School System ROTC, Parish Volunteer Fire Department, BCBS “Blue” Volunteers, CHRISTUS Health System, Southern, and Southeastern LA State University, Lowe’s, The Advocate, the Baton Rouge Dietetic Association, the LA Department of Education, the LA Department of Health and Hospitals, KATC TV3, LA Association for Health, Physical Education, Recreation and Dance, the LA Dietetic Association, the LA Obesity Council, and the Society of Nutrition Education.

Program Evaluation

Process Evaluation

When the public-private partnership between the LSU AgCenter and BCBS was formed, performance goals for the program were established. Specifically, each year at least 50 schools and 30,000 children must participate in the SB Program. Additional funding has allowed the program to exceed goals each year. Programmatic metrics are located in Table 1 of Appendix B.

In order to evaluate the design and instrumentation of the SB program, researchers from the LSU of Human Ecology and Department of Kinesiology conducted a six month pilot study in four elementary schools in East Baton Rouge Parish in the Spring of 2005. Only 4th and 5th grade students (with parental consent) in each of the four pilot schools were include in the pilot investigation. Students’ heights and weights were measured to determine the number of children who were overweight or at-risk of becoming overweight (based on BMI-for-age percentiles). Surveys were administered to assess students’ nutrition and PA knowledge and attitudes. PA duration and intensity were measured using accelerometers.

We wanted to ensure that the program also addressed the needs, concerns, and motivations of those who actually implement the program - the elementary school teachers. Through the use of focus group discussions (FGD), we determined if the comprehensive youth nutrition education and PA program satisfies the professional and educational needs of elementary school teachers. Professional and educational needs covered a broad scope of concerns, including: perception of nutrition

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education and physical activity, perception of training, curricula content, implementation procedures, and delivery methods. Four FGD were conducted among 38 teachers who participated in the program for a minimum of 12 weeks. Questions used in the FGD were based on the PRECEDE/PROCEED theoretical model. Use of the theoretical model enabled researchers to classify information from the FGD into predisposing, reinforcing, and enabling factors. Based on findings from the FGD, slight modifications were made to program delivery methods.

Each school year, following the implementation of SB, feedback is solicited from AgCenter agents, teachers, and youth to identify problem areas, address problems and develop new components for implementation during the following school year.

Outcome Evaluation

The effectiveness of the SB program to promote child wellness and prevent childhood obesity was evaluated through a 2-year formal research project. The study was approved by the LSU and LSU AgCenter Institutional Review Boards.

The primary goals of the research project were: (1) to increase consumption of fruits and vegetables served at school, (2) increase nutrition and PA knowledge and willingness to participate in physical activity and (3) to decrease the number of students in the at risk for overweight or overweight categories.

The two-year formal investigation was conducted among fourteen elementary schools in East Baton Rouge Parish. Schools were stratified based upon student enrollment, the number of students receiving free and reduced price lunch, and state school performance score¹. After schools were clustered, they were pair-matched and then randomly assigned to an intervention or control group. The school performance scores of the 14 schools included in the study were as follows: one received a rating of "2 stars", eight received a rating of "1 star" and five received a rating of "academically unacceptable." Only fourth and fifth grade students with parental consent were included in the research.

Data Collection: Students completed surveys before and after the 12-week program. Additionally, a subsample of students wore activity monitors on their wrists for seven days before and after the program to evaluate PA objectively. Heights and weights were also measured, and Body Mass Index-for-age percentile health reports were generated and given to the school principals and mailed home to parents of students in the intervention group. A random sample of parents from both groups was asked to complete a brief questionnaire. Analysis of the formal research data suggests that:

¹ School performance score was calculated by using one year of assessment data from four LA Standardized tests, and two years of attendance and dropout data. Based on these data, schools received a performance label ranging from "five stars" (highest) to "academically unacceptable" (lowest).

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Objective 1: Fruits and vegetables

- Students participating in SB significantly increased their knowledge about the health benefits of eating fruits and vegetables ($p < .05$) (Figure 1 in Appendix C)
- Students participating in SB significantly increased their self-efficacy scores for the following questions ($p < .05$) (Figure 2 in Appendix C):
 - Intervention students became more sure that they could drink a glass of their favorite juice for breakfast, eat their favorite fruit instead of their usual dessert with lunch, eat their favorite fruit instead of their favorite cookie or candy bar, eat two or more servings of fruit or fruit juice each day, and eat five or more servings of fruits and vegetables each day.

Objective 2: Physical Activity

- The SB intervention did have a positive effect on children's knowledge about physical activity. Using a pre-post test design, as compared to the control group, children who participated in the SB program increased their knowledge about the effects and benefits of PA ($p < .05$) (Figure 3 in Appendix C).
- During this project, we were able to assess activity levels on a small subsample of children by using accelerometers to assess their PA levels over the course of one week. The analysis of the pre-post test data revealed a trend suggesting that the children who experienced the SB intervention had higher overall PA levels than those who did not [$F(1, 56) = 2.97, p = .09$]. There was clear evidence that children had higher activity counts during Take 10! than at lunch, during physical education lessons, and during after school hours, supporting the premise that incorporating Take 10 bouts during the school day is a viable means to increase children's overall levels of PA (Figure 4 in Appendix B).

Objective 3: Children's Weight Status

- One-year follow-up measurements of heights and weights were conducted in April of 2007 to assess prevalence of overweight among the cohort.
- One-year follow-up measurements showed that the percentage of students considered at risk/overweight remained the same among the intervention group students, whereas a slight increase was observed in the control group students. This finding is remarkable considering that the SB program was not designed to be a weight-loss intervention. Rather, the program appeared to equip the students with the knowledge and intention necessary for them to adopt positive lifestyle behaviors.

Communication to Stakeholders

Program outcome information has been reported annually to the AgCenter through impact reports on the AgCenter reporting system. These reports are also made available to the public. Monthly metrics, annual reports and formal presentations are also made to funding agencies. Program impacts are also included in the annual State 4-H Youth Development Report that is submitted to governing bodies. Press releases are annually distributed statewide to all media affiliates in LA. Local AgCenter agents also distribute local press releases when the program is implemented in their parish.

Findings from the formal research have been presented at several local, state and national conferences, including: the 21st Century Families, the American College of Sports Medicine, American Dietetic Association, Baton Rouge Dietetic Association, the BCBS Association Marketing Conference, the Society of Nutrition Education, the LA Association for Physical Education and Recreational Dance, the LA Department of Education, and the Obesity Society. The LA Dietetic Association has also recognized BCBS for their contribution to child wellness.

Local legislators, school board members, and community members receive updates on the program from local LSU AgCenter agents during advisory committee meetings, school board meetings, and school in-service trainings. Blue Cross and Blue Shield representatives communicate information about the program to current and potential policyholders through their website, newsletters, phone advertisements, and enrollment seminars.

Evidence of Sustainability

Schools who participate in SB are able to keep all curricular materials even after their commitment period ends. Because all curricular materials in SB have been linked to the common curriculum standards mandated by the Department of Education, teachers can easily incorporate SB materials as part of their academic learning objectives. School systems have adopted and/or utilized the SB Program as part of their school wellness policy and to meet the legislative mandate for PA. Numerous teachers from participating schools have mailed “thank you” letters and samples of student work which demonstrate how concepts in the SB Program are applied to other academic areas. Students have mailed pictures and letters expressing how they have applied concepts learned through SB to their daily lives.

Replicability

In addition to funding secured from BCBS, other charitable organizations have contributed funds to enable additional schools to receive the SB Program. The design and implementation protocol for SB has been evaluated and can easily be utilized and applied to school-based programs in other states. In 2008, the SB Program was awarded the Blue Works Award from the Blue Cross and Blue Shield Association. Other Blue Plans across the nation can use the SB Program model to implement similar programs in their communities.

Rationale and Importance of Program

Obesity rates among children and adults are increasing at an alarming rate. Poor dietary practices and physical inactivity are the main contributors; therefore, it is important to empower young children with the knowledge needed to establish preventative health behaviors. This can be accomplished through a comprehensive school-based nutrition education and PA program that is both educational and entertaining. A formal research project has demonstrated that participation in the SB Program has increased students’ nutrition and PA knowledge, PA levels and willingness to consume fruits and vegetables.

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Appendices

Appendix A



Photo 1. 4-H Agent conducting OrganWise Guys school assembly.



Photo 2. FCS Agent conducting OrganWise Guys school assembly.



Photo 3. The Body Walk educational exhibit.



Photo 4. Volunteer leading students in an activity in the muscle station of the Body Walk.



Photo 5. Students holding Body Walk activity books after touring the Body Walk exhibit.



Photo 6. Students utilizing OrganWise Guys materials.



Photo 7. Fruit and vegetable taste testing in the classroom.



Photo 8. Students utilizing OrganWise Guys materials.



Photo 9. Students doing a Take 10! in the classroom.



Photo 10. Students doing a Take 10! in the classroom.



Photo 11. Student standing by Smart Bodies sign in front of school.

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Appendix B

Table 1 Smart Bodies Programmatic Metrics					
Year	Schools			Public Events	
	Youth (students)	Teachers	Volunteers	Youth	Adults
2005	32,338	1,156	*	*	*
2006	33,740	1,639	1,774	3, 260	*
2007	33,173	1,835	2,006	2,469	*
2008	33,945	1,792	1,799	3,956	2,289
2009	44,329	2,383	2,260	2,908	1,052
2010	39,564	1,599	1,725	7,246	1,511
2011	40,748	2,244	2,452	9,260	1,802
Notes: * Data not collected					

Appendix C

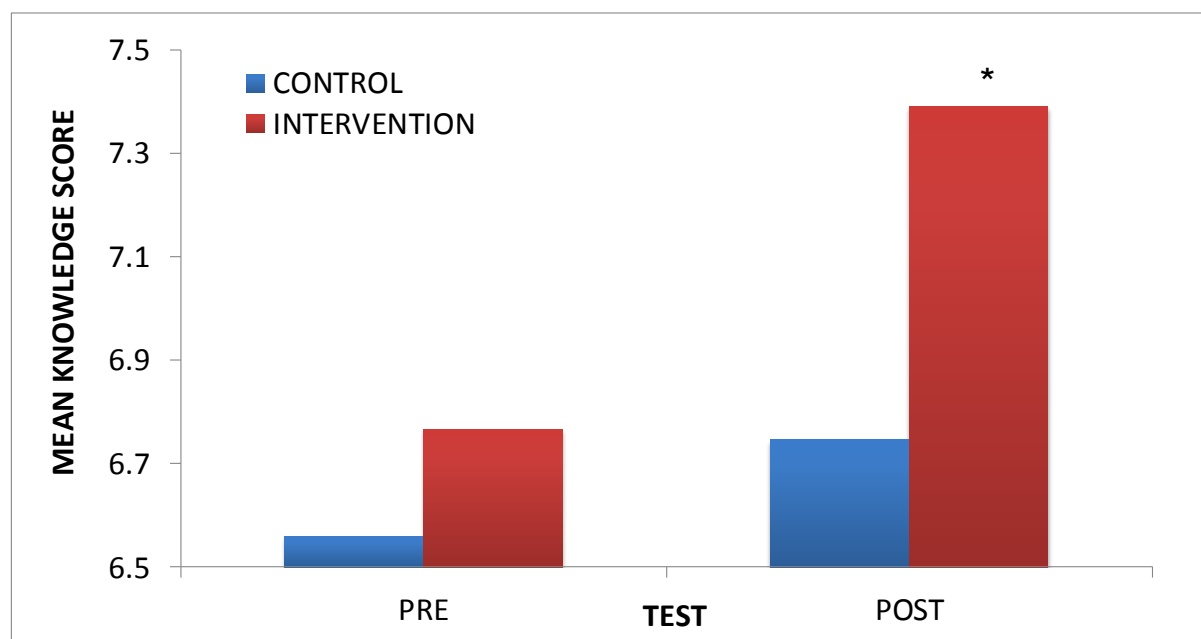


Figure 1. Student nutrition knowledge.

Notes: Intervention is the Smart Bodies Program. * $p < .05$

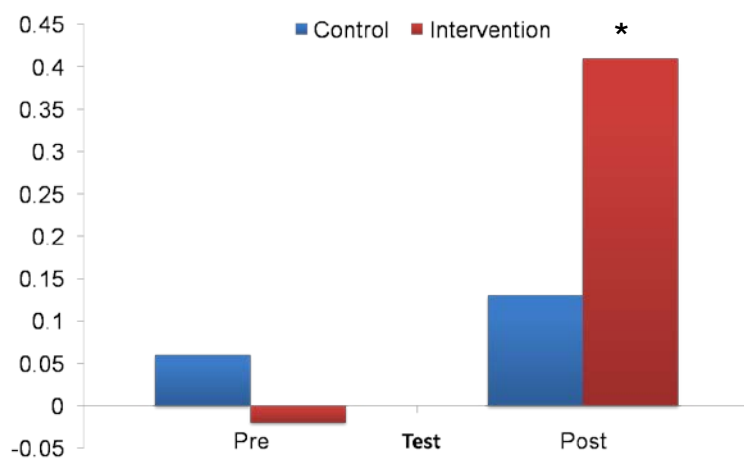


Figure 2. Student self-efficacy to consume fruit and vegetables.
Notes: Intervention is the Smart Bodies Program. * $p < .05$

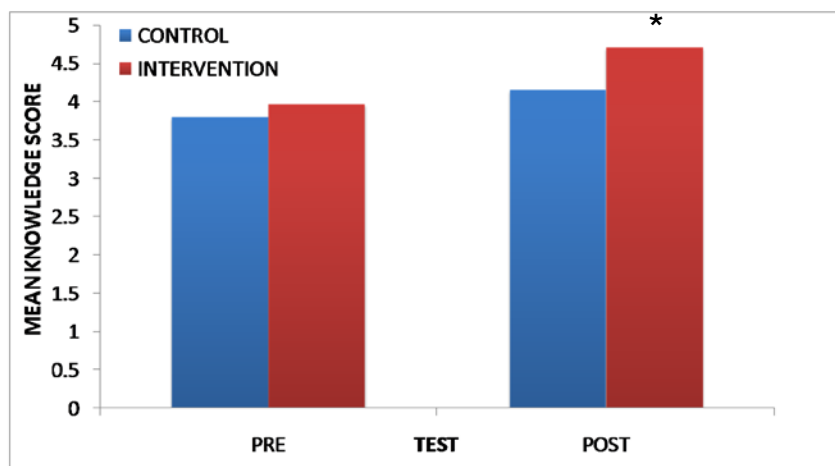


Figure 3. Student physical activity knowledge
Notes: Intervention is the Smart Bodies Program. * $p < .05$

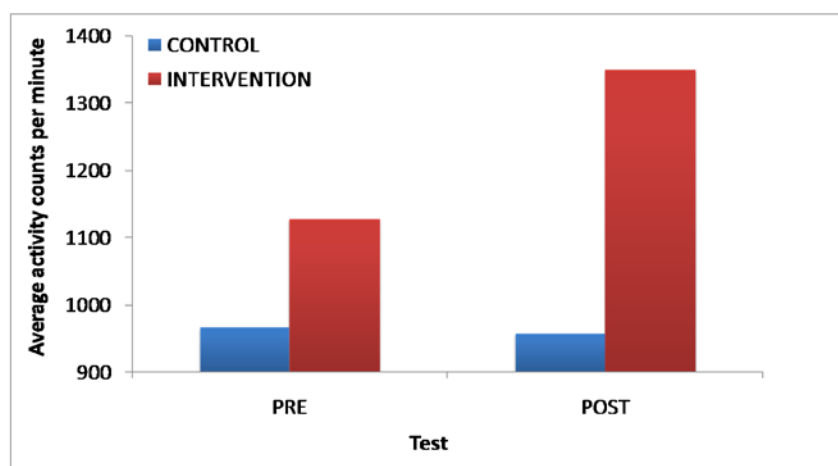


Figure 4. Student physical activity levels during the school day.